## I. AMENDMENT

**In the claims:**

Please amend claims 1, 15, 27, 41, 42, 53, 56, 82, 85, 93 and 96, and add new claims 97 and 98 as follows:

1. (Currently Amended) A slip ring apparatus, comprising:

a first slip ring component, said first slip ring component comprising a first interface surface and at least one first dynamic interface component; and

a second slip ring component, said second slip ring component comprising a second interface surface and at least one second dynamic interface component;

wherein said first and second slip ring components are rotatably coupled together on an axis of slip ring rotation so that said first and second interface surfaces are disposed in facing relationship to form a slip ring boundary therebetween, said axis of slip ring rotation being perpendicular to the plane of said slip ring boundary, and said first and second dynamic interface components being positioned to interact with each other to communicate at least one serial digital signal across said slip ring boundary, said serial digital signal being produced by serializer circuitry integrated within at least one of said first or second slip ring components.

2. (Previously Presented) The slip ring apparatus of claim 1, wherein said first and second dynamic interface components are positioned to interact with each other to communicate at least one serial digital signal across said slip ring boundary at the same

time at least one of said first and second slip ring components is rotating about said axis of slip ring rotation relative to the other of said first and second slip ring components.

3. (Previously Presented) The slip ring apparatus of claim 2, wherein said at least one of said first and second slip ring components that is rotating about said axis of slip ring rotation relative to the other of said first and second slip ring components comprises a printed circuit board.

4. (Previously Presented) The slip ring apparatus of claim 2, wherein said at least one of said first and second slip ring components that is rotating about said axis of slip ring rotation relative to the other of said first and second slip ring components comprises integrated feedback circuitry.

5. (Original) The slip ring apparatus of claim 2, wherein said first and second dynamic interface components comprise components of position sensor circuitry.

6. (Original) The slip ring apparatus of claim 5, wherein said first and second dynamic interface components each comprise tracks of intermittently-spaced conductive segments that form capacitive sensor components of a position sensor mechanism.

7. (Previously Presented) The slip ring apparatus of claim 2, wherein said at least one of first and second slip ring components that is rotating about said axis of slip ring rotation relative to the other of said first and second slip ring components comprises a printed circuit board, said printed circuit board comprising position sensor circuitry.

8. (Canceled)

9. (Original) The slip ring apparatus of claim 2, wherein said first dynamic interface component comprises at least one of a conductive trace or a contact pad; and wherein said second dynamic interface component comprises a brush contact.

10. (Original) The slip ring apparatus of claim 1, wherein said first slip ring component comprises a printed circuit board and is configured to be coupled to an optical block so that said optical block is rotatable with said first slip ring component relative to said second slip ring component; and wherein said printed circuit board of said first slip ring component comprises at least one of control circuitry for said optical block, image processing circuitry for said optical block, power conversion circuitry for said optical block, or a combination thereof.

11. (Previously Presented) The slip ring apparatus of claim 1, wherein said first and second dynamic interface components are positioned to interact with each other to communicate at least one serial digital signal across said slip ring boundary at the same time at least one of said first and second slip ring components is rotating about said axis of slip ring rotation relative to the other of said first and second slip ring components, said at least one serial digital signal comprising a forward or return optical block control signal or an optical block image signal.

12. (Original) The slip ring apparatus of claim 1, wherein said first slip ring component comprises a printed circuit board and is configured to be coupled to a drive actuator so that said drive actuator is capable of imparting rotation to said first slip ring component relative to said second slip ring component; and wherein said printed circuit board of said first slip ring component comprises control circuitry for said drive actuator.

13. (Canceled)

14. (Previously Presented) The slip ring apparatus of claim 1, further comprising a first housing component fixedly coupled to said first slip ring component, and a second housing component fixedly coupled to said second slip ring component so that said first and second slip ring components are disposed between said first second housing components and so that said first and second housing components form a slip ring housing around said first and second slip ring components; wherein said first housing component comprises a first peripheral sealing surface and wherein said second housing component comprises a second peripheral sealing surface; and wherein said first peripheral sealing surface of said first housing component rotatably and sealably mates with said second peripheral surface of said second housing component to form a dynamic seal around the periphery of said slip ring housing.

15. (Currently Amended) A slip ring apparatus, comprising:

a first slip ring component, said first slip ring component comprising a first interface surface and at least one first dynamic interface component; and

a second slip ring component, said second slip ring component comprising a second interface surface and at least one second dynamic interface component;

wherein said first and second slip ring components are rotatably coupled together on an axis of slip ring rotation so that said first and second interface surfaces are disposed in facing relationship to form a slip ring boundary therebetween, said axis of slip ring rotation being perpendicular to the plane of said slip ring boundary, and said first and second dynamic interface components being positioned to interact with each other to communicate at least one signal across said slip ring boundary at the same time at least one of said first and second slip ring components is rotating about said axis of slip ring rotation relative to the other of said first and second slip ring components; ~~and~~

wherein said at least one of said first and second interface surfaces of said first and second slip ring components that is rotating about said axis of slip ring rotation relative to the other of said first and second slip ring components comprises a printed circuit board; and

wherein said printed circuit board comprises integrated circuitry configured to process said at least one signal.

16. (Previously Presented) The slip ring apparatus of claim 15, wherein said first and second dynamic interface components are positioned to interact with each other to continuously communicate said at least one signal across said slip ring boundary at the same time said printed circuit board of said at least one of said first and second slip ring components is rotating relative to said other of said first and second slip ring components.

17. (Original) The slip ring apparatus of claim 16, wherein said at least one signal at least one signal communicated across said slip ring boundary comprises a forward or return optical block control signal, an optical block image signal, or an optical block power signal.

18. (Previously Presented) The slip ring apparatus of claim 16, wherein said first slip ring component comprises a printed circuit board; wherein said first slip ring component is configured to be coupled to an optical block so that said optical block is rotatable with said first slip ring component relative to said second slip ring component; and wherein said printed circuit board of said first slip ring component comprises at least one of control circuitry for said optical block, image processing circuitry for said optical block, power conversion circuitry for said optical block, or a combination thereof.

19. (Original) The slip ring apparatus of claim 18, wherein said at least one signal communicated across said slip ring boundary comprises multiple signals transmitted across said slip ring boundary, said multiple signals comprising a forward or return optical block control signal, a processed optical block image signal, and an optical block power signal.

20. (Original) The slip ring apparatus of claim 18, wherein said first slip ring is configured to be coupled to a drive actuator so that said drive actuator is capable of imparting rotation to said first slip ring component relative to said second slip ring component; and wherein said printed circuit board of said first slip ring component further comprises control circuitry for said drive actuator.

21. (Previously Presented) The slip ring apparatus of claim 19, wherein said first slip ring component comprises a moving first slip ring component printed circuit board substrate; wherein said second slip ring component comprises a stationary second slip ring component substrate; and wherein said first and second dynamic interface components are positioned to interact with each other so as to communicate at least one signal across said slip ring boundary at the same time said moving first slip ring component is rotating relative to said stationary second slip ring component.

22. (Original) The slip ring apparatus of claim 21, wherein said first dynamic interface component comprises at least one of a conductive trace or a contact pad; and wherein said second dynamic interface component comprises a brush contact.

23. (Original) The slip ring apparatus of claim 22, wherein said first dynamic interface component comprises a first track of intermittently-spaced conductive segments, and wherein said second dynamic interface component comprises a second track of intermittently-spaced conductive segments; said first and second tracks of intermittently-spaced conductive segments being positioned to interact with each other without contacting to form a position sensor mechanism.

24. (Original) The slip ring apparatus of claim 23, further comprising a first housing component fixedly coupled to said first slip ring component, and a second housing component fixedly coupled to said second slip ring component so that said first and second slip ring components are disposed between said first and second housing components.

25. (Previously Presented) The slip ring apparatus of claim 24, wherein said first and second housing components form a slip ring housing around said first and second slip ring components; wherein said first housing component comprises a first circular peripheral sealing surface and wherein said second housing component comprises a second circular peripheral sealing surface; and wherein said first circular peripheral sealing surface of said first housing component rotatably and sealably mates with said second circular peripheral surface of said second housing component to form a dynamic seal around the periphery of said slip ring housing.

26. (Original) The slip ring apparatus of claim 25, wherein said dynamic seal comprises a ferro-fluidic seal.

27. (Currently Amended) A camera system, comprising:

a first slip ring apparatus, said first slip ring apparatus comprising:

a moving first slip ring component, said first slip ring component comprising a first slip ring component substrate that comprises a circular platter having a first planar interface surface defined thereon, and at least one first dynamic interface component supported by said first slip ring component substrate, and

a stationary second slip ring component, said second slip ring component comprising a second slip ring substrate that comprises a circular platter having a second planar interface surface defined thereon, and at least one second dynamic interface component supported by said second slip ring component substrate,

wherein said first and second slip ring components are rotatably coupled together so that said first slip ring component rotates relative to said second slip ring component, so that said first and second interface surfaces are disposed in mating facing relationship to form a slip ring boundary therebetween, and so that said first and second dynamic interface components are positioned to interact with each other to continuously communicate at least one signal across said slip ring boundary at the same time said first slip ring component is rotating relative to said second slip ring component;

an optical block coupled to said first slip ring apparatus so that it rotates with said first slip ring component relative to said second slip ring component, said first slip ring component being coupled between said optical block and said second slip ring component; ~~and~~

wherein said first interface surface of said first slip ring component substrate comprises a printed circuit board; and

wherein said printed circuit board comprises integrated circuitry configured to process said at least one signal.

28. (Original) The camera system of claim 27, further comprising a first drive actuator coupled to said first slip ring apparatus to impart rotation to said first slip ring component and said optical block relative to said second slip ring component.

29. (Original) The camera system of claim 28, wherein said first drive actuator comprises a voice coil servo mechanism coupled between said first slip ring component and said optical block.

30. (Previously Presented) The camera system of claim 28, wherein each of said first and second slip ring component substrates comprises a printed circuit board; and wherein said printed circuit board of said first slip ring component comprises at least one of control circuitry for said optical block, image processing circuitry for said optical block, power conversion circuitry for said optical block, control circuitry for said first drive actuator, or a combination thereof.

31. (Original) The camera system of claim 28, wherein said at least one signal communicated across said slip ring boundary comprises multiple signals transmitted across said slip ring boundary, said multiple signals comprising a forward or return optical block control signal, a processed optical block image signal, and an optical block power signal.

32. (Previously Presented) The camera system of claim 28, wherein each of said first and second slip ring component substrates comprises a printed circuit board; and wherein said printed circuit board of said first slip ring component comprises control circuitry for said optical block, image processing circuitry for said optical block, power conversion circuitry for said optical block, and control circuitry for said first drive actuator.

33. (Original) The camera system of claim 32, wherein said at least one signal communicated across said slip ring boundary comprises multiple signals transmitted across said slip ring boundary, said multiple signals comprising a forward or return optical block control signal, a processed optical block image signal, and an optical block power signal.

34. (Original) The camera system of claim 31, wherein each of said multiple signals is communicated across said slip ring boundary by at least one first dynamic interface component to at least one second dynamic interface component; wherein said first dynamic interface component comprises a conductive trace and said second dynamic interface component comprises a brush contact; and wherein said first and second dynamic interface components are positioned to continuously contact each other to communicate said at least one signal across said slip ring boundary at the same time said first slip ring component is rotating relative to said second slip ring component.

35. (Original) The camera system of claim 28, wherein said first dynamic interface component comprises a first track of intermittently-spaced conductive segments, and wherein said second dynamic interface component comprises a second track of intermittently-spaced conductive segments; said first and second tracks of intermittently-spaced conductive segments being positioned to interact with each other without contacting to form a position sensor mechanism.

36. (Original) The camera system of claim 30, wherein said first dynamic interface component comprises a first track of intermittently-spaced conductive segments, and wherein said second dynamic interface component comprises a second track of intermittently-spaced conductive segments; said first and second tracks of intermittently-spaced conductive segments being positioned to interact with each other without contacting to form a position sensor mechanism.

37. (Original) The camera system of claim 28, further comprising a first housing component fixedly coupled to said first slip ring component, and a second housing component fixedly coupled to said second slip ring component so that said first and second slip ring components are disposed between said first and second housing components.

38. (Previously Presented) The camera system of claim 37, wherein said first and second housing components form a slip ring housing around said first and second slip ring components; wherein said first housing component comprises a first circular peripheral sealing surface and wherein said second housing component comprises a second circular peripheral sealing surface; and wherein said first circular peripheral sealing surface of said first housing component rotatably and sealably mates with said second circular peripheral surface of said second housing component to form a dynamic seal around the periphery of said slip ring housing.

39. (Original) The camera system of claim 38, wherein said dynamic seal comprises a ferro-fluidic seal.

40. (Original) The camera system of claim 28, wherein said first drive actuator is coupled to said first slip ring apparatus to impart rotation to said first slip ring component and said optical block in a pan axis direction; and wherein said camera system further comprises a second slip ring apparatus coupled to said optical block and a second drive actuator coupled to said second slip ring apparatus to impart rotation to said optical block in a tilt axis direction.

41. (Currently Amended) The camera system of claim ~~28~~ 40, wherein said second slip ring apparatus comprises:

a moving first slip ring component, said first slip ring component of said second slip ring apparatus comprising a first slip ring component substrate that comprises a circular platter having a first planar interface surface defined thereon, and at least one first dynamic interface component supported by said first slip ring component substrate of said second slip ring apparatus; and

a stationary second slip ring component, said second slip ring component of said second slip ring apparatus comprising a second slip ring substrate that comprises a circular platter having a second planar interface surface defined thereon, and at least one second dynamic interface component supported by said second slip ring component substrate of said second slip ring apparatus;

wherein said first and second slip ring components of said second slip ring apparatus are rotatably coupled together so that said first slip ring component of said second slip ring apparatus rotates relative to said second slip ring component of said second slip ring apparatus, so that said first and second interface surfaces of said second slip ring apparatus are disposed in mating facing relationship to form a slip ring boundary of said second slip ring apparatus therebetween, and so that said first and second dynamic interface components of said second slip ring apparatus are positioned to interact with each other to continuously communicate at least one signal across said slip ring boundary of said second slip ring apparatus at the same time said first slip ring component of said second slip ring apparatus is rotating relative to said second slip ring component of said second slip ring apparatus; and

wherein said optical block is coupled to said second slip ring apparatus so that it rotates with said first slip ring component of said second slip ring apparatus relative to said second slip ring component of said second slip ring apparatus, said first slip ring component of said second slip ring apparatus being coupled between said optical block and said second slip ring component of said second slip ring apparatus.

42. (Currently Amended) A method of communicating at least one serial digital signal across a slip ring boundary, comprising:

providing a slip ring apparatus, comprising:

a first slip ring component, said first slip ring component comprising a first interface surface and at least one first dynamic interface component, and

a second slip ring component, said second slip ring component comprising a second interface surface and at least one second dynamic interface component,

wherein said first and second slip ring components are rotatably coupled together on an axis of slip ring rotation so that said first and second interface surfaces are disposed in facing relationship to form said slip ring boundary therebetween, said axis of slip ring rotation being perpendicular to the plane of said slip ring boundary, and said first and second dynamic interface components being positioned to interact with each other to communicate at least one serial digital signal across said slip ring boundary;

rotating at least one of said first and second slip ring components about said axis of slip ring rotation relative to the other of said first and second slip ring components; and

using said first and second dynamic interface components to communicate said at least one serial digital signal across said slip ring boundary simultaneously with said rotation, <u>said serial digital signal being produced by serializer circuitry integrated within at least one of said first or second slip ring components</u>.

43. (Previously Presented) The method of claim 42, wherein said first and second dynamic interface components comprise components of position sensor circuitry, and wherein said method further comprises using said first and second dynamic interface components to sense a position of said first slip ring component relative to said second slip ring component.

44. (Original) The method of claim 42, further comprising rotating said first slip ring component while holding said second slip ring component stationary.

45. (Original) The method of claim 42, wherein said first dynamic interface component comprises at least one of a conductive trace or a contact pad; and wherein said second dynamic interface component comprises a brush contact.

46. (Original) The method of claim 42, wherein said first slip ring component comprises a printed circuit board; wherein said method further comprises providing an optical block coupled to said first slip ring component so that said optical block is rotatable with said first slip ring component relative to said second slip ring component, and rotating said optical block with said first slip ring component; and wherein said printed circuit board of said first slip ring component comprises at least one of control circuitry for said optical block, image processing circuitry for said optical block, power conversion circuitry for said optical block, or a combination thereof.

47. (Original) The method of claim 42, wherein said first slip ring component comprises a printed circuit board; and wherein said method further comprises:

providing an optical block coupled to said first slip ring component so that said optical block is rotatable with said first slip ring component relative to said second slip ring component;

rotating said optical block with said first slip ring component; and

controlling said optical block at least in part using circuitry of said printed circuit board, or processing image data from said optical block at least in part using circuitry of said printed circuit board, or providing power for said optical block at least in part using circuitry of said printed circuit board, or a combination thereof.

48. (Previously Presented) The method of claim 42, wherein said method further comprises providing an optical block coupled to said first slip ring component so that said optical block is rotatable with said first slip ring component relative to said second slip ring component, and rotating said optical block with said first slip ring component; and wherein said at least one serial digital signal comprises a forward or return optical block control signal or an optical block image signal.

49. (Original) The method of claim 42, wherein said first slip ring component comprises a printed circuit board; and wherein said method further comprises:

providing a drive actuator coupled to said first slip ring component;

using said drive actuator to rotate said first slip ring component relative to said second slip ring component; and

controlling said drive actuator at least in part using circuitry of said printed circuit board.

50. (Original) The method of claim 49, wherein said method further comprises:

providing an optical block coupled to said first slip ring component so that said optical block is rotatable with said first slip ring component relative to said second slip ring component;

using said drive actuator to rotate said first slip ring component and said optical block relative to said second slip ring component; and

controlling said optical block at least in part using circuitry of said printed circuit board, or processing image data from said optical block at least in part using circuitry of said printed circuit board, or providing power for said optical block at least in part using circuitry of said printed circuit board, or a combination thereof.

51. (Canceled)

52. (Previously Presented) The method of claim 42, wherein said first slip ring component comprises a first slip ring component substrate and wherein said second slip ring component comprises a second slip ring component substrate, each of said first and second slip ring component substrates comprising a circular platter; and wherein said method further comprises:

providing a first housing component fixedly coupled to said first slip ring component, and a second housing component fixedly coupled to said second slip ring component so that said first and second slip ring components are disposed between said first second housing components and so that said first and second housing components form a slip ring housing around said first and second slip ring components;

wherein said first housing component comprises a first circular peripheral sealing surface and wherein said second housing component comprises a second circular peripheral sealing surface; and

wherein said first circular peripheral sealing surface of said first housing component rotatably and sealably mates with said second circular peripheral surface of said second housing component to form a dynamic seal around the periphery of said slip ring housing.

53. (Currently Amended) A slip ring apparatus, comprising:

a first slip ring component, said first slip ring component comprising at least two first dynamic interface components; and

a second slip ring component, said second slip ring component comprising at least two second dynamic interface components;

serializer circuitry integrated within said first slip ring component and ~~wherein said first slip ring component is coupled to circuitry~~ configured to generate a differential serial digital signal;

wherein said first and second slip ring components are rotatably coupled together to form a slip ring boundary therebetween, said first and second dynamic interface components being positioned to interact with each other to communicate said differential serial digital signal across said slip ring boundary.

54. (Previously Presented) The slip ring apparatus of claim 53, wherein said differential serial digital signal comprises a differential serial digital video signal.

55. (Previously Presented) The slip ring apparatus of claim 53, wherein said first slip ring component comprises a first interface surface, and said second slip ring component comprises a second interface surface; wherein said first and second slip ring components are rotatably coupled together on an axis of slip ring rotation so that said first and second interface surfaces are disposed in facing relationship to form said slip ring boundary therebetween, said axis of slip ring rotation being perpendicular to the plane of said slip ring boundary; and wherein said first and second dynamic interface components are positioned to interact with each other to communicate said differential serial digital signal across said slip ring boundary ring at the same time at least one of said first and second slip ring components is rotating relative to the other of said first and second slip ring components.

56. (Currently Amended) A method of communicating at least one differential serial digital signal across a slip ring boundary, comprising:

providing a slip ring apparatus, comprising:

a first slip ring component, said first slip ring component comprising at least two first dynamic interface components, ~~and~~

a second slip ring component, said second slip ring component comprising at least two second dynamic interface components, and

serializer circuitry integrated within said first slip ring component,

wherein said first and second slip ring components are rotatably coupled together to form a slip ring boundary therebetween, said first and second dynamic interface components being positioned to interact with each other to

communicate said at least one differential digital signal across said slip ring boundary;

rotating at least one of said first and second slip ring components relative to the other of said first and second slip ring components; and

using said first and second dynamic interface components to communicate said at least one differential serial digital signal across said slip ring boundary simultaneously with said rotation.

57. (Previously Presented) The method of claim 56, wherein said differential serial digital signal comprises a differential serial digital video signal.

58. (Previously Presented) The method of claim 56, wherein said first slip ring component comprises a first interface surface, and said second slip ring component comprises a second interface surface; wherein said first and second slip ring components are rotatably coupled together on an axis of slip ring rotation so that said first and second interface surfaces are disposed in facing relationship to form said slip ring boundary therebetween, said axis of slip ring rotation being perpendicular to the plane of said slip ring boundary; wherein said first and second dynamic interface components are positioned to interact with each other to communicate said differential serial digital signal across said slip ring boundary ring at the same time at least one of said first and second slip ring components is rotating relative to the other of said first and second slip ring components; and wherein said rotating comprises rotating at least one of said first and second slip ring components about said axis of slip ring rotation relative to the other of said first and second slip ring components.

59. (Previously Presented) The slip ring apparatus of claim 1, wherein said at least one serial digital signal comprises a high speed serial digital signal.

60. (Previously Presented) The slip ring apparatus of claim 2, wherein said at least one of said first and second slip ring components that is rotating about said axis of slip ring rotation relative to the other of said first and second slip ring components comprises video processing circuitry.

61. (Previously Presented) The slip ring apparatus of claim 14, wherein said dynamic seal comprises a ferro-fluidic seal.

62. (Previously Presented) The slip ring apparatus of claim 15, wherein said printed circuit board comprises integrated feedback circuitry.

63. (Previously Presented) The slip ring apparatus of claim 15, wherein said printed circuit board comprises video processing circuitry.

64. (Previously Presented) The camera system of claim 27, wherein said at least one signal comprises a serial digital signal.

65. (Previously Presented) The camera system of claim 64, wherein said serial digital signal comprises a high speed serial digital signal.

66. (Previously Presented) The camera system of claim 27, wherein said printed circuit board comprises integrated feedback circuitry.

67. (Previously Presented) The camera system of claim 27, wherein said printed circuit board comprises video processing circuitry.

68. (Previously Presented) The method of claim 42, wherein said at least one serial digital signal comprises a high speed serial digital signal.

69. (Previously Presented) The method of claim 42, wherein said first slip ring component further comprises integrated feedback circuitry; and wherein said method further comprises rotating said first slip ring component about said axis of slip ring rotation relative to said second slip ring component.

70. (Previously Presented) The method of claim 42, wherein said first slip ring component further comprises video processing circuitry; and wherein said method further comprises rotating said first slip ring component about said axis of slip ring rotation relative to said second slip ring component.

71. (Previously Presented) The method of claim 52, wherein said dynamic seal comprises a ferro-fluidic seal.

72. (Previously Presented) The slip ring apparatus of claim 53, wherein said differential serial digital signal comprises a high speed differential serial digital signal.

73. (Previously Presented) The method of claim 56, wherein said differential serial digital signal comprises a high speed differential serial digital signal.

74. (Previously Presented) A slip ring apparatus, comprising:

a first slip ring component, said first slip ring component comprising at least one first dynamic interface component; and

a second slip ring component, said second slip ring component comprising at least one second dynamic interface component;

wherein said first and second slip ring components are rotatably coupled together to form a slip ring boundary therebetween, said first and second dynamic interface components being positioned to interact with each other to communicate at least one signal across said slip ring boundary; and

wherein at least one of said first and second slip ring components comprises integrated feedback circuitry.

75. (Previously Presented) The slip ring apparatus of claim 74, wherein said first slip ring component further comprises a first interface surface; wherein said second slip ring component comprises a second interface surface; and wherein said first and second slip ring components are rotatably coupled together on an axis of slip ring rotation so that said first and second interface surfaces are disposed in facing relationship to form said slip ring boundary therebetween, said axis of slip ring rotation being perpendicular to the plane of said slip ring boundary.

76. (Previously Presented) The slip ring apparatus of claim 75, wherein said first slip ring component comprises a moving slip ring component and said second slip ring component comprises a stationary slip ring component; wherein said first slip ring component comprises said integrated feedback circuitry; and wherein said first slip ring component is configured to be coupled to an optical block so that said optical block is rotatable with said first slip ring component relative to said second slip ring component.

77. (Previously Presented) The slip ring apparatus of claim 76, wherein slip ring apparatus is configured as a camera system comprising said optical block.

78. (Previously Presented) A slip ring apparatus, comprising:

a first slip ring component, said first slip ring component comprising a first interface surface and at least one first dynamic interface component;

a second slip ring component, said second slip ring component comprising a second interface surface and at least one second dynamic interface component; and

a first housing component fixedly coupled to said first slip ring component, and a second housing component fixedly coupled to said second slip ring component so that said first and second slip ring components are disposed between said first second housing components and so that said first and second housing components form a slip ring housing around said first and second slip ring components;

wherein said first and second slip ring components are rotatably coupled together on an axis of slip ring rotation so that said first and second interface surfaces are disposed in facing relationship to form a slip ring boundary therebetween, said axis of slip ring rotation being perpendicular to the plane of said slip ring boundary, and said first and second dynamic interface components being positioned to interact with each other to communicate at least one signal across said slip ring boundary; and

wherein said first housing component comprises a first peripheral sealing surface and wherein said second housing component comprises a second peripheral sealing surface; and wherein said first peripheral sealing surface of said first housing component rotatably and sealably mates with said second peripheral surface of said second housing component to form a dynamic ferro-fluidic seal around the periphery of said slip ring housing.

79. (Previously Presented) The slip ring apparatus of claim 78, wherein said first slip ring component comprises a moving slip ring component and said second slip ring component comprises a stationary slip ring component; and wherein said first slip ring component is configured to be coupled to an optical block so that said optical block is rotatable with said first slip ring component relative to said second slip ring component.

80. (Previously Presented) The slip ring apparatus of claim 79, wherein slip ring apparatus is configured as a camera system comprising said optical block.

81. (Previously Presented) The slip ring apparatus of claim 80, wherein said differential serial digital signal comprises a high speed differential serial digital signal.

82. (Currently Amended) A slip ring apparatus, comprising:

a first slip ring component, said first slip ring component comprising at least one first dynamic interface component; and

a second slip ring component, said second slip ring component comprising at least one second dynamic interface component;

wherein said first slip ring component is coupled to circuitry configured to generate at least one high speed signal;

wherein said first and second slip ring components are rotatably coupled together to form a slip ring boundary therebetween, said first and second dynamic interface components being positioned to interact with each other to communicate said at least one high speed signal across said slip ring

boundary, said at least one high speed signal being processed by circuitry integrated within at least one of said first or second slip ring components.

83. (Previously Presented) The slip ring apparatus of claim 82, wherein said high speed signal comprises a high speed digital signal.

84. (Previously Presented) The slip ring apparatus of claim 82, wherein said high speed signal comprises a high speed analog signal.

85. (Currently Amended) A method of communicating at least one at least one high speed signal across a slip ring boundary, comprising:

providing a slip ring apparatus, comprising:

a first slip ring component, said first slip ring component comprising at least one first dynamic interface component, and

a second slip ring component, said second slip ring component comprising at least one second dynamic interface component,

wherein said first and second slip ring components are rotatably coupled together to form a slip ring boundary therebetween, said first and second dynamic interface components being positioned to interact with each other to communicate said at least one high speed signal across said slip ring boundary;

rotating at least one of said first and second slip ring components relative to the other of said first and second slip ring components;

generating said at least one high speed signal;

processing said at least one high speed signal with circuitry integrated within at least one of said first or second slip ring components; and

communicating said at least one high speed signal across said slip ring boundary simultaneous with said rotation.

86. (Previously Presented) The method of claim 85, wherein said high speed signal comprises a high speed digital signal.

87. (Previously Presented) The method of claim 85, wherein said high speed signal comprises a high speed analog signal.

88. (Previously Presented) A slip ring apparatus, comprising:

a first slip ring component, said first slip ring component comprising at least one first dynamic interface component; and

a second slip ring component, said second slip ring component comprising at least one second dynamic interface component;

wherein said first slip ring component is coupled to circuitry configured to generate at least one signal;

wherein said first and second slip ring components are rotatably coupled together to form a slip ring boundary therebetween, said first and second dynamic

interface components being positioned to interact with each other to communicate said at least one signal across said slip ring boundary at the same time at least one of said first and second slip ring components is rotating relative to the other of said first and second slip ring components; and

wherein said at least one of said first and second slip ring components that is rotating relative to the other of said first and second slip ring components comprises at least one of integrated feedback circuitry, video processing circuitry, local control circuitry, or a combination thereof.

89. (Previously Presented) The slip ring apparatus of claim 88, wherein said first slip ring component comprises a moving slip ring component and said second slip ring component comprises a stationary slip ring component; wherein said first slip ring component comprises at least one of said integrated feedback circuitry, said video processing circuitry, said local control circuitry, or a combination thereof; and wherein said first slip ring component is configured to be coupled to an optical block so that said optical block is rotatable with said first slip ring component relative to said second slip ring component.

90. (Previously Presented) The slip ring apparatus of claim 89, wherein said first slip ring component comprises integrated feedback circuitry.

91. (Previously Presented) The slip ring apparatus of claim 89, wherein said first slip ring component comprises video processing circuitry.

92. (Previously Presented) The slip ring apparatus of claim 89, wherein said first slip ring component comprises local control circuitry.

93. (Currently Amended) A method of operating a slip ring apparatus, comprising:

providing a slip ring apparatus, comprising:

a first slip ring component, said first slip ring component comprising at least one first dynamic interface component, and

a second slip ring component, said second slip ring component comprising at least one second dynamic interface component,

wherein said first and second slip ring components are rotatably coupled together to form a slip ring boundary therebetween, said first and second dynamic interface components being positioned to interact with each other to communicate said at least one signal across said slip ring boundary at the same time at least one of said first and second slip ring components is rotating relative to the other of said first and second slip ring components;

rotating at least one of said first and second slip ring components relative to the other of said first and second slip ring components; and

performing at least one of the following steps or a combination thereof:

sensing a position of said first slip ring component relative to said second slip ring component using integrated circuitry that is rotating with said at least one of said first and second slip ring components, or

processing at least one video signal using circuitry that is rotating with said at least one of said first and second slip ring components, or

controlling at least one component that is ~~is~~ rotating with said at least one of said first and second slip ring components using circuitry that is ~~is~~ rotating with said at least one of said first and second slip ring components.

94. (Previously Presented) The method of claim 93, wherein said method further comprises providing an optical block coupled to rotate with said at least one of said first and second slip ring components relative to the other of said first and second slip ring components; rotating said optical block with said at least one of said first and second slip ring components relative to the other of said first and second slip ring components; and sensing a position of said first slip ring component relative to said second slip ring component using integrated circuitry that is rotating with said at least one of said first and second slip ring components.

95. (Previously Presented) The method of claim 94, wherein said method further comprises providing an optical block coupled to rotate with said at least one of said first and second slip ring components relative to the other of said first and second slip ring components; rotating said optical block with said at least one of said first and second slip ring components relative to the other of said first and second slip ring components; and processing at least one video signal using circuitry that is rotating with said at least one of said first and second slip ring components.

96. (Currently Amended) The method of claim 94, wherein said method further comprises providing an optical block coupled to rotate with said at least one of said first and second slip ring components relative to the other of said first and second slip ring

components; rotating said optical block with said at least one of said first and second slip ring components relative to the other of said first and second slip ring components; and controlling at least one component that is ~~is~~ rotating with said at least one of said first and second slip ring components using circuitry that is ~~is~~ rotating with said at least one of said first and second slip ring components.

97. (New) A camera system, comprising:

a first slip ring apparatus, said first slip ring apparatus comprising:

a moving first slip ring component, said first slip ring component comprising a first slip ring component substrate that comprises a circular platter having a first planar interface surface defined thereon, and at least one first dynamic interface component supported by said first slip ring component substrate, and

a stationary second slip ring component, said second slip ring component comprising a second slip ring substrate that comprises a circular platter having a second planar interface surface defined thereon, and at least one second dynamic interface component supported by said second slip ring component substrate,

wherein said first and second slip ring components are rotatably coupled together so that said first slip ring component rotates relative to said second slip ring component, so that said first and second interface surfaces are disposed in mating facing relationship to form a slip ring boundary therebetween, and so that said first and second dynamic interface components are positioned to interact with each other to continuously communicate at least one signal across said slip ring boundary at the same

time said first slip ring component is rotating relative to said second slip ring component;

an optical block coupled to said first slip ring apparatus so that it rotates with said first slip ring component relative to said second slip ring component, said first slip ring component being coupled between said optical block and said second slip ring component

a first drive actuator coupled to said first slip ring apparatus to impart rotation to said first slip ring component and said optical block relative to said second slip ring component;

wherein said first slip ring component substrate comprises a printed circuit board;

wherein said first drive actuator is coupled to said first slip ring apparatus to impart rotation to said first slip ring component and said optical block in a pan axis direction; and

wherein said camera system further comprises a second slip ring apparatus coupled to said optical block and a second drive actuator coupled to said second slip ring apparatus to impart rotation to said optical block in a tilt axis direction.

98. (New) The camera system of claim 97, wherein said second slip ring apparatus comprises:

a moving first slip ring component, said first slip ring component of said second slip ring apparatus comprising a first slip ring component substrate that comprises a circular platter having a first planar interface surface defined thereon, and at least one first dynamic interface component supported by

said first slip ring component substrate of said second slip ring apparatus; and

a stationary second slip ring component, said second slip ring component of said second slip ring apparatus comprising a second slip ring substrate that comprises a circular platter having a second planar interface surface defined thereon, and at least one second dynamic interface component supported by said second slip ring component substrate of said second slip ring apparatus;

wherein said first and second slip ring components of said second slip ring apparatus are rotatably coupled together so that said first slip ring component of said second slip ring apparatus rotates relative to said second slip ring component of said second slip ring apparatus, so that said first and second interface surfaces of said second slip ring apparatus are disposed in mating facing relationship to form a slip ring boundary of said second slip ring apparatus therebetween, and so that said first and second dynamic interface components of said second slip ring apparatus are positioned to interact with each other to continuously communicate at least one signal across said slip ring boundary of said second slip ring apparatus at the same time said first slip ring component of said second slip ring apparatus is rotating relative to said second slip ring component of said second slip ring apparatus; and

wherein said optical block is coupled to said second slip ring apparatus so that it rotates with said first slip ring component of said second slip ring apparatus relative to said second slip ring component of said second slip ring apparatus, said first slip ring component of said second slip ring apparatus being coupled between said optical block and said second slip ring component of said second slip ring apparatus.

## II. RESPONSE TO OFFICE ACTION

Claims 1, 15, 27, 41, 42, 53, 56, 82, 85, 93 and 96 have been amended to even more particularly point out and claim the subject matter of the claims. New claims 97 and 98 have been added. Claims 1-7, 9-12, 14-50 and 52-98 are pending in the present application.

Support for the new claims and claim amendments may be found in the claims as originally filed and throughout the Specification, for example, at page 26, line 1 to page 27, line 14; and Figures 7-8.

### A. Owens and Wakiyama References

The Examiner has cited U.S. Patent No. 5,172,039 to Owens, and U.S. Patent No. 6,392,693 to Wakiyama in the text of the Office Action. However, these references were not listed in the Form PTO-892 that accompanied the Office Action. To ensure that these references are included on the cover page of a patent granted based on this application, Applicants respectfully request that the Examiner list these two references on a Form PTO-892 and provide a copy of same to Applicants.

### B. The 35 U.S.C. § 102 Rejection Over Sobhani

The Examiner rejected claims 15 and 16 under 35 U.S.C. §102(b) as being unpatentable over U.S. Patent No. 5,484,294 to Sobhani. Applicants respectfully traverse these rejections for the following reasons.

Amended independent claim 15 recites, in part, "at least one of said first and second interface surfaces of said first and second slip ring components that is rotating

about said axis of slip ring rotation relative to the other of said first and second slip ring components *comprises a printed circuit board*" and "said printed circuit board comprises integrated circuitry *configured to process said at least one signal*" (emphasis added).

In order to support an anticipation rejection under 35 U.S.C. § 102(b), each and every element of the rejected claim must be found in the cited art. In the present case, Sobhani does not disclose, teach or suggest a slip ring component that includes a printed circuit board comprising integrated circuitry configured to process a signal. Thus, claim 15, and the claims dependent therefrom, are novel and nonobvious over Sobhani. Applicants therefore respectfully request that the rejection of these claims be withdrawn. Favorable reconsideration is requested.

## C. The 35 U.S.C. § 103 Rejection Over Wakiyama in view of Hannah and Others.

The Examiner rejected claims 1-7, 9-12, 60, and 82-92 under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 6,392,693 to Wakiyama in view of U.S. Patent No. 5,568,192 to Hannah and others. Applicants respectfully traverse this rejection for the following reasons.

Amended independent claim 1 recites, in part, a "serial digital signal being produced by serializer circuitry *integrated within* at least one of said first or second slip ring components" (emphasis added). Amended independent claim 82 recites, in part, "at least one high speed signal being processed by circuitry *integrated within* at least one of said first or second slip ring components" (emphasis added). Amended independent

claim 85 recites, in part, "processing said at least one high speed signal with circuitry *integrated within* at least one of said first or second slip ring components" (emphasis added). Independent claim 88 recites, in part, "wherein said at least one of said first and second slip ring components that is rotating relative to the other of said first and second slip ring components *comprises* at least one of integrated feedback circuitry, video processing circuitry, local control circuitry, or a combination thereof" (emphasis added).

With regard to independent claims 1, 82 and 85, neither Wakiyama or Hannah disclose, teach or suggest production of a serial digital signal by serializer circuitry *integrated within* a slip ring component, nor processing of a signal by circuitry *integrated within* a slip ring component. With regard to independent claim 88, neither Wakiyama or Hannah or U.S. Patent No. 6,612,848 to Brundage disclose, teach or suggest a slip ring component that *comprises* integrated feedback circuitry, video processing circuitry, or local control circuitry. To the contrary, Wakiyama merely describes a slip ring **9** that "transmits signals *between* the camera control circuit **11** and the camera unit **3**, *between* the tilt motor control circuit **12** and the tilt motor **5**, *between* the vertical position sensor **22** and the microprocessor **14** through the tilt motor control circuit **12**" (emphasis added) (*see* Col. 5, lines 50-54), and Hannah discloses *nothing* regarding slip rings at all. Therefore, for this reason alone, independent claims 1, 82, 85 and 88, and the claims dependent therefrom are novel and non-obvious over the cited references.

In addition to the above, Applicants also note that Wakiyama does not disclose anything concerning an axis of slip ring rotation that is *perpendicular* to the plane of a slip ring boundary *across which* first and second dynamic interface components are positioned to interact with each other to communicate at least one serial digital signal. To

the contrary, neither the text or Figure 1 (slip ring 9) of Wakiyama discloses or shows any details concerning dynamic interface components or positioning of such interface components relative to slip ring boundary orientation.

**D. The 35 U.S.C. § 103 Rejection Over Blackshear and Others**

The Examiner rejected claims 15-22, 62-63 and 88-92 under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 5,111,288 to Blackshear in view of Brundage and others. Applicants respectfully traverse this rejection for the following reasons.

Amended independent claim 15 recites, in part, "at least one of said first and second interface surfaces of said first and second slip ring components that is rotating about said axis of slip ring rotation relative to the other of said first and second slip ring components *comprises a printed circuit board*" (emphasis added).

The Examiner combines Blackshear with Brundage to reject claim 15. However, Blackshear discloses a cylindrical "rotary connector" 39 that appears to have contact surfaces on the outer cylindrical surface of the cylinder (*see* Figures 2 and 3). Such a cylindrical contact surface actually *teaches away* from any modification that would result in an interface surface that comprises a printed circuit board such as recited by claim 15. For this reason alone, independent claim 15, and the claims dependent therefrom, are novel and non-obvious over these cited references.

## E. The 35 U.S.C. § 103 Rejection Over Wakiyama in view of Brundage and Others

The Examiner rejected claims 15-22, 27-38, 64-66, 67, 69, 70, and 74-77 as being unpatentable over Wakiyama in view of Brundage and others. Applicants respectfully traverse this rejection for the following reasons.

Amended independent claim 15 recites, in part, "wherein said at least one of said first and second interface surfaces of said first and second slip ring components that is rotating about said axis of slip ring rotation relative to the other of said first and second slip ring components comprises a printed circuit board" and "wherein said printed circuit board *comprises integrated circuitry configured to process said at least one signal*" (emphasis added). Amended independent claim 27 recites, in part, "a moving first slip ring component . . . comprising a first slip ring component substrate" and "wherein said first interface surface of said first slip ring component substrate comprises a printed circuit board" and "wherein said printed circuit board *comprises integrated circuitry configured to process said at least one signal*" (emphasis added). Independent claim 74 recites, in part, "wherein at least one of said first and second slip ring components *comprises integrated feedback circuitry*" (emphasis added).

Regarding claims 15 and 27, neither Wakiyama or Brundage disclose, teach or suggest an interface surface of a moving or rotating slip ring component or component substrate that comprises a printed circuit board that itself comprises integrated circuitry configured to process a signal communicated across a slip ring boundary. Therefore, for this reason alone, independent claims 15 and 27, and the claims dependent therefrom, are novel and non-obvious over these cited references. Regarding independent claim 74,

neither Wakiyama or Brundage disclose, teach or suggest a slip ring component that comprises integrated feedback circuitry. *Neither reference even mentions feedback circuitry.* Therefore, for this reason alone, independent claim 74, and the claims dependent therefrom are novel and non-obvious over the cited references.

Claims 69-70 depend from amended independent claim 42, which is shown to be novel and non-obvious elsewhere herein.

**F. <u>The 35 U.S.C. § 103 Rejection Over Sobhani in view of Hannah and Others</u>**

The Examiner rejected claims 1 and 14 under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 5,484,294 to Sobhani in view of Hannah. Applicants respectfully traverse this rejection for the following reasons.

As previously mentioned, amended independent claim 1 recites, in part, a "serial digital signal being produced by serializer circuitry *integrated within* at least one of said first or second slip ring components" (emphasis added). Neither Sobhani or Hannah disclose, teach or suggest production of a serial digital signal by serializer circuitry *integrated within* a slip ring component. For this reason alone, independent claim 1, and the claims dependent therefrom (including claim 14), are novel and non-obvious over these cited references.

However, Applicants further point out that dependent claim 14 recites, in part, "wherein said first peripheral sealing surface of said first housing component rotatably and sealably mates with said second peripheral surface of said second housing component to form *a dynamic seal* around the periphery of said slip ring housing" (emphasis added).

One exemplary embodiment of a dynamic seal area is found described and illustrated with respect to element 560 of Figure 5A of the current application.

With regard to the rejection of claim 14, the Examiner points to first housing (11) and second housing (12) of Sobhani. However, nothing in the figures or text of Sobhani discloses, teaches or suggests that housings 11 and 12 rotatably and sealably mate, or form a dynamic seal, in the manner as recited in claim 14. If this rejection is maintained, the Examiner is asked to indicate where in the figures and/or text of Sobhani that these features are found.

## G. The 35 U.S.C. § 103 Rejection Over Sobhani in view of Wakiyama and Others

The Examiner rejected claims 17-22, 23-26, 61, 78-80 and 81 under 35 U.S.C. §103 as being unpatentable over Sobhani in view of Wakiyama and others. Applicants respectfully traverse this rejection for the following reasons.

Claims 17-22, 23-26 depend directly or indirectly from amended claim 15. Amended independent claim 15 recites, in part, "wherein said at least one of said first and second interface surfaces of said first and second slip ring components that is rotating about said axis of slip ring rotation relative to the other of said first and second slip ring components comprises a printed circuit board" and "wherein said printed circuit board *comprises integrated circuitry configured to process said at least one signal*" (emphasis added). Independent claim 78 recites, in part, "said first peripheral sealing surface of said first housing component rotatably and sealably mates with said second peripheral surface of said second housing component to form *a dynamic ferro-fluidic seal* around the periphery of said slip ring housing" (emphasis added).

Neither Sobhani or Wakiyama disclose, teach or suggest an interface surface of a rotating slip ring component that comprises a printed circuit board that itself comprises integrated circuitry configure to process a signal communicated across a slip ring boundary. The other references cited in combination with Sobhani and Wakiyama add nothing in this regard. Therefore, for this reason alone, claims 17-22, 23-26 are novel and non-obvious over these cited references.

Claim 61 depends from claim 14, which has already been shown to be novel and non-obvious over Sobhani above. Claim 61 is therefore also novel and non-obvious for the same reasons.

Independent claim 78, and the claims dependent therefrom, are also novel and non-obvious over these cited references for similar reasons given with respect to dependent claim 14 above, *i.e.,* nothing in the figures or text of Sobhani discloses, teaches or suggests that housings 11 and 12 rotatably and sealably mate, or form a dynamic seal, in the manner as recited in dependent claim 14 or independent claim 78. As stated before, if these rejections are maintained, the Examiner is asked to indicate where in the figures and/or text of Sobhani that these features are found.

## H. The 35 U.S.C. § 103 Rejection Over Wakiyama and Others

The Examiner rejected claims 42-50, 52-59, 71-73 and 93-96 under 35 U.S.C. §103 as being unpatentable over Wakiyama and others. Applicants respectfully traverse this rejection for the following reasons.

Amended independent claim 42 recites, in part, "said serial digital signal being produced by serializer circuitry *integrated within* at least one of said first or second slip ring components" (emphasis added). Amended independent claims 53 and 56 each recite, in part, "serializer circuitry *integrated within* said first slip ring component" (emphasis added). Amended independent claim 93 recites, in part, "*sensing a position* of said first slip ring component relative to said second slip ring component *using integrated circuitry that is rotating* with said at least one of said first and second slip ring components" or "*processing at least one video signal using circuitry that is rotating* with said at least one of said first and second slip ring components" or "*controlling at least one component* that is rotating with said at least one of said first and second slip ring components *using circuitry that is rotating* with said at least one of said first and second slip ring components" (emphasis added).

Regarding amended independent claims 42, 53 and 56, none of the cited references disclose, teach or suggest production of a serial digital signal by serializer circuitry *integrated within* a slip ring component. For this reason alone, independent claims 42, 53, 56 and the claims dependent therefrom, are novel and non-obvious over these cited references. Regarding amended independent claim 93, none of the cited references disclose, teach or suggests performing the recited steps *using integrated circuitry that is rotating* with a slip ring component. For this reason alone, independent claim 93, and the claims dependent therefrom, are novel and non-obvious over these cited references.

## I. The New Claims

New independent claim 97 corresponds to previous claim 40 (*i.e.*, as it stood prior to this amendment) written in independent form including all of the limitations of the base claim and any intervening claims. In the office action, the Examiner indicated that the subject matter of previous claim 40 would be allowable if so rewritten. Therefore, new claim 97 and claim 98 dependent therefrom, are both allowable.

Applicants note that new claim 98 depends from new claim 97 and corresponds to previous claim 41, with the exception that the dependency has been corrected to provide proper antecedent basis to the limitations of new claim 98.

## J. Conclusion

The pending claims have been shown above to be allowable over the cited references. Applicants therefore respectfully submit that claims 1-7, 9-12, 14-50 and 52-98 are in condition for allowance. Reconsideration of the application and claims is courteously solicited.